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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/695,248	10/27/2003	Rodney L. Naro	NAROP0335US	4323

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EXAMINER	
MCNELIS, KATHLEEN A	
ART UNIT	**PAPER NUMBER**
1742	

DATE MAILED: 12/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/695,248	NARO, RODNEY L.	
	Examiner	Art Unit	
	Kathleen A. McNelis	1742	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *Jan 23, 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *Jan 23,2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Claims Status

Claims 1-22 remain for examination wherein claims 4-22 are amended.

Examiner's Comments

In the first submittal of claims, two claims were identified as claim 3. Subsequently, claims were renumbered, however dependency references were not amended. The following assumptions were made for purposes of examination:

- The 2nd original claim 3 was renumbered as amended claim 4. Original claim 4 was renumbered as amended claim 5, and depends from "claim 3". For purposes of examination, it is assumed that amended claim 5 depends from amended claim 4 (previously the 2nd claim 3).
- Original claim 7 was renumbered as amended claim 8. Amended claims 9-14 and 18-22 depend from "claim 7". For purposes of examination, it was assumed that amended claims 9-14 and 18-22 actually depend from amended claim 8, since original claim 7 was amended to claim 8.
- Original claim 13 was renumbered as amended claim 14. Amended claims 15-17 depend from "claim 13". For purposes of examination, it was assumed that amended claims 15-17 actually depend from amended claim 14.

DETAILED ACTION

Claim Rejections - 35 USC § 102

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 8 and 18-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Kemeny et al. (U.S. Pat. No. 5,279,639).

With respect to claim 1, the statement in the preamble that the purpose or intended use of the additive is for "fluxing and fluidizing slags" has not been given patentable weight (See M.P.E.P. Section 2111.02 (II)).

Kemeny et al. discloses an additive for synthesizing and treating ladle slag that mitigates the effects of primary slag carried over from the steelmaking vessel into the ladle, is low in bulk density (foaming slag), is suitable for refining steel and in not corrosive to ladle refractory or lining (col. 1 lines 5-21). Kemeny et al. discloses a composition for ladle slag synthesis and treating ladle slag which comprises calcium carbonate, magnesium carbonate, alumina, silica (as glass) and sodium oxide (as sodium carbonate, synonym soda ash) as in instant claim 1 (col. 7 lines 30-45).

With respect to claim 8, Kemeny et al. discloses a method for fluxing and fludizing slags in molten metal by adding a flux composition to the metal (col. 8 lines 32-68) where the flux composition includes calcium carbonate, magnesium carbonate, alumina, silica and sodium oxide as described above regarding claim 1.

With respect to claim 18, Kemeny et al. discloses that the molten metal is tapped into a ladle and that the flux is added to the tapping stream (col. 8 lines 30-68). Since the molten metal is tapped to the ladle and the flux is added to the tapping stream, this is the same as putting the flux in the ladle.

With respect to claim 19, Kemeny et al. discloses an example wherein 1,500 lbs of flux was added per 150 tons of steel melt (0.5 %, col. 8. lines 30-61), which is within the claimed range of between 0.01 and 0.75%.

With respect to claim 20, Kemeny et al. discloses an example wherein 1.5 to 2.0 lbs of slag modifier was added per ton of steel (0.075 to 0.1%, col. 9, lines 35-41), which is within the claimed range of between 0.01 and 0.10%.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 2, 3, 7, 9, 10, 12, 21, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kemeny et al. (U.S. Pat. No. 5,279,639).

Kemeny et al. discloses using an additive for synthsis and treating of ladle slags as described above regarding claims 1 and 8.

With respect to claims 2, 3, 9 and 10, the range disclosed by Kemeny et al. overlaps with the ranges in instant claims 2 and 9 and 3 and 10 as shown below:

Component	Composition Range (%)		
	Kemeny et al. (col. 7 lines 25-45)	Instant claims 2 and 9	Instant claims 3 and 10
Calcium carbonate	0-60	8 - 28.7	12 – 16
Magnesium carbonate	0-30	0 -18.5	11.5 – 15
Alumina	0-40	3.6 -18.0	8 – 14
Silica[1]	0-20	1.4 -7.1	4.5 – 6.5
Sodium oxide as soda ash[2]	0-35	19.4 -46.4	26.1 – 31.9

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a composition of:

- between 8 and 28.7% or 12 and 16% calcium carbonate, because Kemeny et al. teaches that any calcium carbonate composition between 0 and 60% can be used for ladle slag synthesis and treating (col. 1 lines 25-45).
- between 0 and 18.5% or 11.5 and 15% magnesium carbonate, because Kemeny et al. teaches that any composition between 0 and 30% can be used for ladle slag synthesis and treating (col. 7 lines 25-45).
- between 3.6 and 18.0% or 8 and 14% alumina, because Kemeny et al. teaches that any composition between 0 and 40% can be used for ladle slag synthesis and treating (col. 7 lines 25-45).
- between 1.4 and 7.1% or 4.5 and 6.5% silica, because Kemeny et al. teaches that any composition between 0 and 20% can be used for ladle slag synthesis and treating (col. 7 lines 25-45).
- between 19.4 and 35% or 26.1 and 31.9% sodium oxide as soda ash, because Kemeny et al. teaches that any composition between 0 and 35% can be used for ladle slag synthesis and treating (col. 7 lines 25-45).

With respect to claim 7 and 12, Kemeny et al. does not disclose that the material used is powder as in instant claims 7 and 12, but does teach that the size of the flux

[1] Listed as "glass" in Kemeny et al.
[2] Listed as "sodium carbonate" in Kemeny et al.

ingredients were sized from ¼ - inch by down prior to mixing (col. 8 lines 55 to 68). Powders would be included in a range of less than ¼ - inch.

With respect to claims 21 and 22, Kemeny et al. discloses an example wherein a slag modifying flux is added in an amount of 1.5 to 2 lbs/ ton of steel (0.075 to 0.1%; col. 9 lines 35-55). The range of between 0.075% and 0.1% is overlaps the claimed range of from 0.025 and 0.075% in instant claim 21 and 0.035 to 0.075% in instant claim 22. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a flux to steel ratio of 0.075%, since Kemeny et al. teaches that any amount of slag modifier added within the amount of 0.075 to 1.0% is beneficial

Claims 4-6 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kemeny et al. (U.S. Pat. No. 5,279,639) as applied to claims 1 and 8 and further in view of Threlkeld (U.S. Pat. No. 2,862,809).

Kemeny et al. discloses using an additive for synthsis and treating of ladle slags as described above regarding claims 1 and 8.

Kemeny et al. does not teach that a release agent is added as in claim 4, that the release agent is polyglycol as in claim 5 or that the additive is an agglomeration as in claims 6 and 11.

Threkeld discloses a process for briquetting soda ash so as to reduce the amount of heat required for melting and allow the use of light soda ash which is not otherwise suitable for use in iron melts as a powder (col. 1 lines 20-30). The briquettes are made by pressing light soda ash (58 % sodium oxide) with polyglycols, which are then added to the melt (col. 3 lines 1-15). Threkeld teaches that polyglycols are

effective binding agents for soda ash, and when melted produce very little carbon, no metallic, non-volatile or objectionable residues to remain in the melt (col. 2 lines 34-45). Threlkeld does not use the term "release agent", however it is inherent that upon introduction to the melt, the polyglycol will release the soda ash. It would have been obvious to one of ordinary skill in the art at the time the invention was made to briquette the soda ash using polyglycol as taught by Threlkeld prior to use in the process of Kemeny et al., since Threkeld teaches that birquetting the soda ash allows the use of light soda ash an reduces the amount of heat required for melting, and that polyglycol is an effective binder that will not leave behind objectionable residues in the melt.

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kemeny et al. (U.S. Pat. No. 5,279,639) as applied to claim 8 and further in view of Graf (U.S. Pat. No. 2,760,859).

Kemeny et al. discloses a method for adding a powdered flux to a ladle as described above regarding claims 1, 8 and 18.

Kemeny et al. does not teach adding a bag containing the powder as in instant claim 13.

Graf discloses a method for adding metallurgical flux to ferrous metals in electric furnace, cupola and ladle applications (col. 2 lines 6-13) wherein powdered flux is bagged prior to adding to ladles due to it being finely divided (col. 4 lines 4-10). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include adding the flux to a bag as taught by Graf prior to treating the ladle slag of Kemeny et al. to contain the finely divided particles as taught by Graf.

Claims 1, 8 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dvorak et al. (U.S. Pat. No. 3,721,547) in view of Mrdjenovich (U.S. Pat. No. 4,137,071).

Dvorak et al. discloses a method for fluxing and fluidizing the slag in a cupola by adding a fluxing material comprising calcium oxide as limestone (i.e. calcium carbonate), alumina, sodium oxide and silica (abstract).

Dvorak et al. does not disclose adding magnesium carbonate to the flux.

Mrdjenovich discloses a low cost method of fluidizing cupola slag wherein the fluxing and fluidizing charge uses magnesia substituted for a part of the calcium carbonate. Mrdjenovich teaches that in prior art, calcium fluoride used to fluidize the slag generated hydrogen fluoride gas which condensing as hydrofluoric acid deteriorated the effectiveness of collection equipment and was expensive (col. 1 lines 1-68). Mrdjenovich substitutes magnesia in the form of dolomite (45% magnesium carbonate) which decomposes at a lower temperature than high calcium stone. The combination of magnesia and soda ash replace fluorspar (abstract and col. 3 lines 30-59) in providing fluidity (col. 2 lines 1-12). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use magnesium carbonate as taught by Mrdjenovich as a substitute for calcium fluoride in the flux of Dvorak et al. to fluidize the slag at a lower cost in materials and equipment wear as taught by Mrdjenovich.

Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dvorak et al. (U.S. Pat. No. 3,721,547) in view of Mrdjenovich (U.S. Pat. No.

4,137,071) as applied to claim 14 and further in view of the ASM Metals Handbook, 9th edition, Vol. 15 Casting (pp. 368-374).

Dvorak et al. in view of Mrdjenovich discloses a flux composition and method of fluxing a slag in a furnace as described above regarding claims 1, 8 and 14.

Dvorak et al. in view of Mrdjenovich does not disclose that this is done in an electric coreless induction furnace as in instant claim 15, or a vertical channel furnace that employs and inductor loop as in instant claim 16.

The ASM Handbook teaches that induction furnaces have become the most widely use means for melting iron due to excellent metallurgical control coupled with relatively pollution-free operation (p. 368).

With regard to claim 15, the electric coreless furnace is now provided with medium-frequency power supply which allows the units to be completely emptied for alloy changes or factory shutdowns (ASM Handbook, vol. 15, p. 369). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a Coreless type induction furnace as taught by the ASM Handbook in the melting process of Dvorak et al. in view of Mrdjenovich, to benefit from the excellent metallurgical control coupled with relatively pollution-free operation and the ability to completely empty the furnace for alloy changes or factory shutdowns as taught by the ASM Handbook.

With regard to claim 16, the ASM Handbook teaches that the channel type induction furnaces are the most economical to manufacture in large sizes and use power more efficiently than coreless furnaces (ASM Handbook, Vol. 15, p. 368). It

would have been obvious to one of ordinary skill in the art at the time the invention was made to use a channel type induction furnace as taught by the ASM Handbook in the melting process of Dvorak et al. in view of Mrdjenovich, to benefit from the excellent metallurgical control coupled with relatively pollution-free operation and the lower capital and operating cost of the channel furnace as taught by the ASM Handbook.

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dvorak et al. (U.S. Pat. No. 3,721,547) in view of Mrdjenovich (U.S. Pat. No. 4,137,071) as applied to claim 14 and further in view of Shimada et al. (U.A. Pat. No. 5,559,827).

Dvorak et al. in view of Mrdjenovich discloses a flux composition and method of fluxing a slag in a furnace as described above regarding claims 1, 8 and 14.

Dvorak et al. in view of Mrdjenovich does not disclose that this is done in a pressure pour furnace with inductor loop as in instant claim 17.

Shimada et al. discloses an induction furnace serving for both vacuum melting and pressure pouring which allows for continuous metal removal without entrainment of slag, thus allowing production of large size ingots (col. 1 line 65- col. 2 line 5). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use an induction furnace with pressure pour and vacuum melting a taught by Shimada et al. in the melting process of Dvorak et al. in view of Mrdjenovich to allow production of large size ingots in vacuum melting as taught by Shimada et al.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kathleen A. McNelis whose telephone number is 571-272-3554. The examiner can normally be reached on M-F 8:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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